REMARKS

We are in receipt of the Office Action dated January 10, 2003, and the accompanying Amendment and following remarks are made in light thereof.

Claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25-30, 49, 51, 53, and 55-58 are pending in the present application, with claims 26, 28 and 30 being cancelled, and claims 59-68 being added by the present Amendment.

In the Office Action of January 10, 2003, claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 51, 53 and 55-58 stand rejected for obviousness over the combination of Sasaki et al. 6,020,869 and Nakai et al. 6,072,454, either alone or further in view of Mase et al. 5,337,171 and/or Ito et al. 5,959,603, or Ishida et al. 6,069,609, or Kusano et al. 5,677,704. These rejections have been made final.

Initially, Applicant notes that claims 25, 27 and 29 have not been examined. These claims are dependent from claims 1, 3 and 5, respectively. For the purposes of responding to this Office Action, Applicant will assume that claims 25, 27 and 29 are rejected at least for the reason set forth with respect to each of claims 1, 3 and 5.

In his rejections, the Examiner cites Sasaki et al. for disclosing a multi-gray level irradiation display device having a gray-level control circuit 331 and gray-level generating circuits 311, 313, 315, 317 and 319 (with reference to Fig. 39). Nakai et al. is cited for disclosing a liquid crystal display device having an OCB mode liquid crystal. The Examiner concludes that "it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate an OCB mode liquid crystal taught for Nakai et al. for the twist nematic TN liquid crystal of Sasaki et al.

Applicant respectfully submits that Sasaki et al. do not teach or suggest a digital driven active matrix display device that can be driven at a high speed, as can the device of the present application. See the specification at page 1, lines 21-22. Consequently, Applicants submit there would have been no motivation or incentive to combine the teachings of Nakai et al. with those of Sasaki et al.

Claims 3, 5 and 58 are rejected over Sasaki et al. in view of Nakai et al. and further in view of Ito et al. Sasaki et al. and Nakai et al. are discussed above. The Examiner additionally cites Ito et al. for disclosing divided subframes. Applicant respectfully submits that each of these three references fails to teach the claimed feature of applying a voltage which makes an orientation of liquid crystal to a bend orientation on starting display of the 2^{m-n} subframes. Accordingly, Applicant submits that these claims would not be obvious over the combination of these references.

Applicant has amended claims 1, 3, 5, 57 and 58 to address some punctuation issues and also to delete the term "only." Claim 55 is similarly amended to delete the term "only." This Amendment has been made so that these claims are not unduly limited. The new claims 59-68 are all dependent claims and Applicant believes that no new issues are raised thereby.

Based on the foregoing, Applicant respectfully requests the Examiner to reconsider and allow the pending claims.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claims 26, 28 and 30 have been cancelled.

Claims 1, 3, 5, 55, 57 and 58 have been amended as follows:

1. (Currently Amended) A liquid crystal display device comprising:

an active matrix substrate comprising an active matrix circuit in which a plurality of pixel TFTs are disposed in a matrix, and a source driver, and a gate driver that drive the active matrix circuit; and

an opposing substrate comprising an opposing electrode,

wherein the liquid crystal display device is characterized as:

performing display by optically compensated bend mode; and

conducting voltage gray scale method and time ratio gray scale at the same time by using n bit out of m bit digital data as information for voltage gray scale, and ~~only~~ (m-n) bit as information for time ratio gray scale, wherein m and n are positive numbers equal to or greater than 2 and satisfy m>n.

3. (Currrently Amended) A liquid crystal display device comprising:

an active matrix substrate comprising an active matrix circuit in which a plurality of pixel TFTs are disposed in a matrix, and a source driver and a gate driver that drive the active matrix circuit;

an opposing substrate comprising an opposing electrode; and

a circuit which converts m bit digital video data inputted from the external into n bit digital video data and provides the n bit digital video data to the source driver, wherein m and n are positive numbers equal to or greater than 2 and satisfy m>n,

wherein the liquid crystal display device is characterized as:

forming an image for one frame image comprising 2^{m-n} subframes by performing voltage gray scale method and time ratio gray scale that uses ~~only~~ (m-n) bit at the same time, and;

applying voltage which makes an orientation of liquid crystal to a bend orientation on starting display of the 2^{m-n} subframes.

5. (Currently Amended) A liquid crystal display device comprising:

an active matrix substrate comprising an active matrix circuit in which a plurality of pixel TFTs are disposed in a matrix, and a source driver and a gate driver that drive the active matrix circuit; and

a circuit which converts m bit digital video data inputted from the external into n bit digital video data and provides the n bit digital video data to the source driver, wherein m and n are positive numbers equal to or greater than 2 and satisfy m>n,

wherein the liquid crystal display device is characterized as:

forming an image for one frame image comprising 2^{m-n} subframes by performing voltage gray scale method and time ratio gray scale that uses ~~only~~ (m-n) bit at the same time;

applying voltage which makes an orientation of liquid crystal to a bend orientation on starting display of the frame which comprises 2^{m-n} subframes.

55. (Currently Amended) A liquid crystal display device comprising:

a first substrate;

a plurality of pixel thin film transistors disposed in a matrix form over the substrate;

a source driver operationally connected to said plurality of pixel thin film transistors;

an opposing substrate provided with an opposing electrode; and

a liquid crystal layer interposed between the first substrate and the opposing electrode, said liquid crystal layer having a p cell structure; and

a digital video data time ratio gray scale processing circuit, operationally connected to said source driver,

wherein a m bit digital video data inputted to the digital video data time ratio gray scale processing circuit is converted into an n bit digital video data for voltage gray scale while ~~only~~ (m - n) bit data of the m bit digital video data is used for time ratio gray scale.

57. (Currently Amended) A method of driving a liquid crystal display device comprising:

an active matrix substrate comprising an active matrix circuit in which a plurality of pixel TFTs are disposed in a matrix, and a source driver, and a gate driver that drive the active matrix circuit; and

an opposing substrate comprising an opposing electrode;

wherein the method of driving the liquid crystal display device is characterized as:

performing display by optically compensated bend mode, and

conducting voltage gray scale method and time ratio gray scale at the same time by using n bit out of m bit digital data as information for voltage gray scale, and ~~only~~ (m-n) bit as information for time ratio gray scale, wherein m and n are positive numbers equal to or greater than 2 and satisfy m>n.

58. (Currently Amended) A method of driving a liquid crystal display device comprising:

an active matrix substrate comprising an active matrix circuit in which a plurality of pixel TFTs are disposed in a matrix, and a source driver and a gate driver that drive the active matrix circuit;

an opposing substrate comprising an opposing electrode; and

a circuit which converts m bit digital video data inputted from the external into n bit digital video data and provides the n bit digital video data to the source driver, wherein m and n are positive numbers equal to or greater than 2 and satisfy m>n,

wherein the method of the liquid crystal display device is characterized as:

forming an image for one frame image comprising 2^{m-n} subframes by performing voltage gray scale method and time ratio gray scale that uses ~~only~~ (m-n) bit at the same time, and;

applying voltage which makes an orientation of liquid crystal to a bend orientation on starting display of the 2^{m-n} subframes.